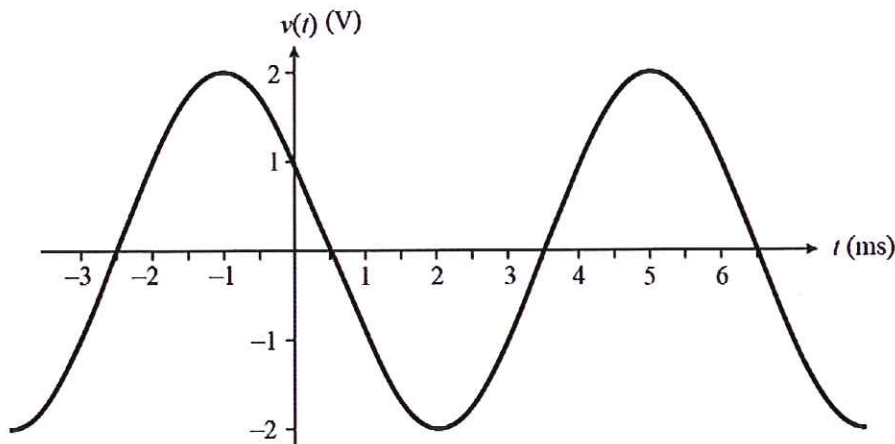


4. (15 points)



$$v(t) = A \cos(2\pi ft + \phi)$$

Find the values of A , f , and ϕ . Include appropriate units.

sol'n: We can find period T from zero crossings one cycle apart.

$$T = 6.5 \text{ ms} - 0.5 \text{ ms} = 6 \text{ ms}$$

$$f = \frac{1}{T} = \frac{1}{6 \text{ ms}} = \frac{1}{6} \text{ kHz} \doteq 167 \text{ Hz}$$

The peak of $v(t)$ to the left of $t=0$ is halfway between zero crossings.

$$\Delta t = \frac{-2.5 \text{ ms} + 0.5 \text{ ms}}{2} = -1 \text{ ms}$$

$$\phi = -\frac{\Delta t}{T} \cdot 360^\circ = -\frac{(-1 \text{ ms})}{6 \text{ ms}} \cdot 360^\circ = 60^\circ$$

The peak height of $v(t)$ is $A = 2 \text{ V}$